

## PHASE-OUT STRATEGIES FOR VINYL APPLIED BY THE VIENNESE HOSPITALS

Bruno Klausbruckner and Herbert Nentwich, KAV, Vienna



Better blood in vinyl than vinyl in blood... (Photo: Moshhammer)

**Vinyl (PVC) causes manifold problems during production, use and disposal. Therefore the Vienna Hospitals Administration (Wiener Krankenanstaltenverbund, KAV) in 1989 began to intensively analyse this topic. Already then the monomer used in the production, vinyl chloride, was known to cause bladder cancer.**

Throughout the intended use of the PVC product the softener DEHP (diethylhexylphthalate) is increasingly seen as a problem. The toxicity (and especially reproductive toxicity) of this now ubiquitous substance is well established. Additionally heavy metals like lead or cadmium have been applied as stabilisers of PVC until cadmium was finally prohibited as an additive.

In waste incineration the high chlorine content (approx. 57%) can lead to the generation of polychlorinated dioxins and furans. The same is true in case of fire. Apart from chlorine-organic compounds also hydrochloric acid is

formed which could corrode the concrete-and-steel constructions.

### **In which way did KAV replace PVC?**

Since 1989 KAV is active in phasing out respectively replacing PVC. The first milestone was reached in 1992 when packing materials for all medical products were demanded to be PVC free. This was a remarkable step indeed bearing in mind that in the same year a study from the University Hospital in Graz showed that nearly a third of all PVC in the hospital's waste was packaging material.

Constant awareness raising campaigns by the KAV environmental protection department helped to further reduce the amount of PVC in hospital waste. Between 1992 and 1995 step by step PVC was replaced by more environmentally friendly compounds like latex, silicon, ethylvinylacetate-copolymers, polyethylene, polypropylene, or even glass in catheters, infusion tubes and bags, and bottles of all sorts.

The efforts to replace PVC in gloves by latex soon reached some limits due to allergic reactions in hospital staff. Gloves from nitrile rubber were also considered inappropriate because of the problem-

atic isocyanides and because of their higher price. Therefore repeated attempts to reduce the use of gloves where feasible proved to be more successful.

All these measures led to a reduction of PVC to 2.5% of the hospital waste. This figure was affirmed in a study performed in three houses of the KAV, a general hospital, a paediatrics hospital and a nursing home.

In 1999 another study in a large hospital of the KAV indicated that the ongoing campaign remained successful. Two third of all product groups under investigation (including syringes of different size, canulas, pipette tips, partly gloves, all sorts of cups, feeders, tooth brushes, tweezers, nappies, razors, electrodes, protective sheets for surgery, wristbands for identification purposes, mouth-nose masks from fleece, containers for stool probes) were absolutely PVC-free. PVC in the hospital waste was reduced to 0.6%.

#### **DEHP in child intensive care**

Increasingly the risks of DEHP in intensive care especially in pre-term and in intensive care children was recognised. Therefore in the paediatrics hospitals of the KAV the chemical composition of all single-use materials was evaluated. In this survey those products were of particular interest that come in close contact with the child (e.g. invasive treatment devices, tubes, etc.). In total 700 products were analysed for PVC (using the Beilstein test) by the KAV environmental protection department. In the paediatrics hospital of Glanzing the PVC content in the hospital waste was 0.47% in 2001 and was further reduced to 0.37% in 2003.

#### **PVC in building materials**

PVC is also frequently used in building materials as e.g. for windows or floor coverings. But for instance PVC floor coverings contain huge amounts of the endocrine disruptor tributyltin. Floors from PVC could easily be replaced by rubber, linoleum or polyolefin although in the operation tracts for many years only PVC did fulfil the requirements concerning electric conductivity. Nowadays rubber floors are available that fulfil all the needed requirements.

Building materials from PVC are of great concern in case of fire. Combustion products containing chlorine and the intensive fumes pose a great danger both when evacuation a burning building and in case of reuse afterwards. Contamination from dioxins and furans might turn out very costly after a fire.

A good example for the use of non-PVC building products only was the total renovation of pavilion "Austria" in the "Otto Wagner" hospital in Vienna. Intensive planning work and special product specification templates were necessary to achieve this goal not only concentrating on PVC but on environmentally friendly and sustainable products in general.

- It was possible to get all these products totally PVC-free:
- All pipes in the building (water, heating, electricity)
- All cables for electricity and for medical gases
- Doors and windows including seals
- Floors and baseboards

„Non-PVC“ was part of the tender and was strictly controlled afterwards. Calculations in the end showed that the application of all the criteria for ecological and sustainable building materials only lead to an increase of total costs by 1 to 2 percent. For ordinary flats the extra costs would only amount to less than 0.5 %. These extra costs are negligible taking account the increase in quality of life and the – sometimes considerably - longer duration of use, not to speak of the benefits for the environment.

Other projects with consequent avoidance of PVC were applied in pavilion 16 in Lainz and in pavilion 6 in Baumgarten.

#### **Conclusion**

We should try to replace PVC wherever possible and economically feasible. Although this does need a lot of planning and calls for sometimes very intensive search for alternatives this is the case in many instances. Our aim therefore still is the PVC-free hospital which is in near reach. Nevertheless even more measures and intensified activities are necessary and will be undertaken.



Single use lab equipment. (Photo: Moshammer)